10-26-2006

A Nexus of Education, Inspiration, Research and Play

Andrew Phelps
Rochester Institute of Technology

R·I·T
GCCIS

games.rit.edu

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CHANGE THE WORLD

SCHOLARSHIP AND INNOVATION AT R·I·T

ANDREW PHELPS

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College of Computing & Information Sciences
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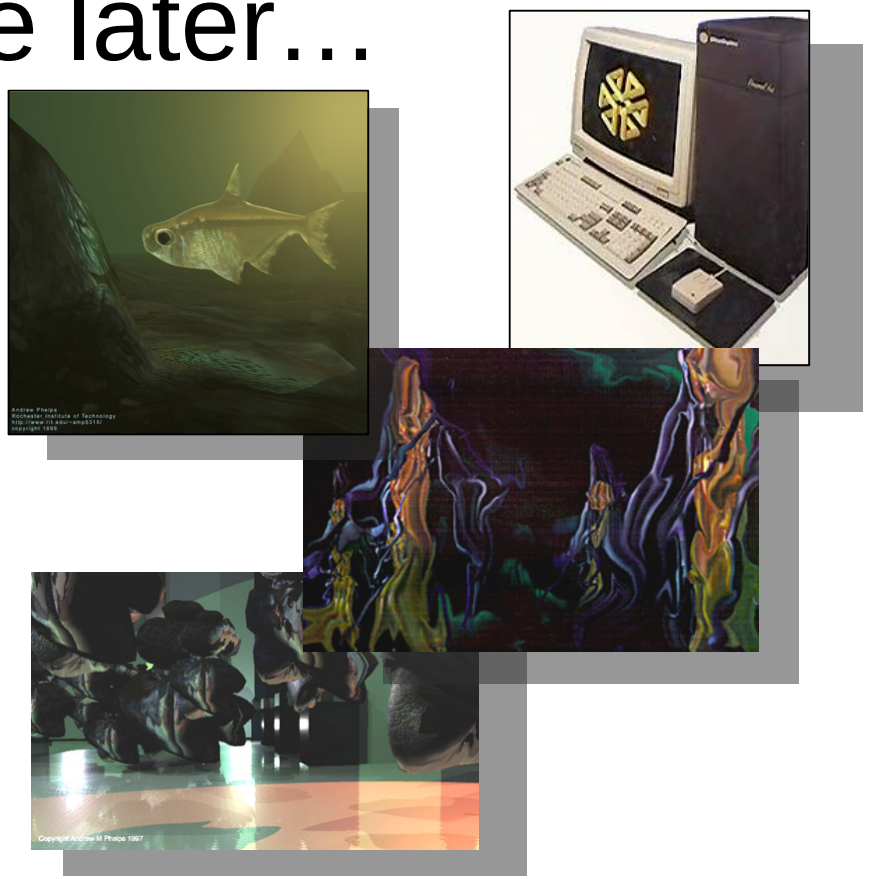
Andy…

When I was growing up, my dream job was to illustrate fantasy book covers.

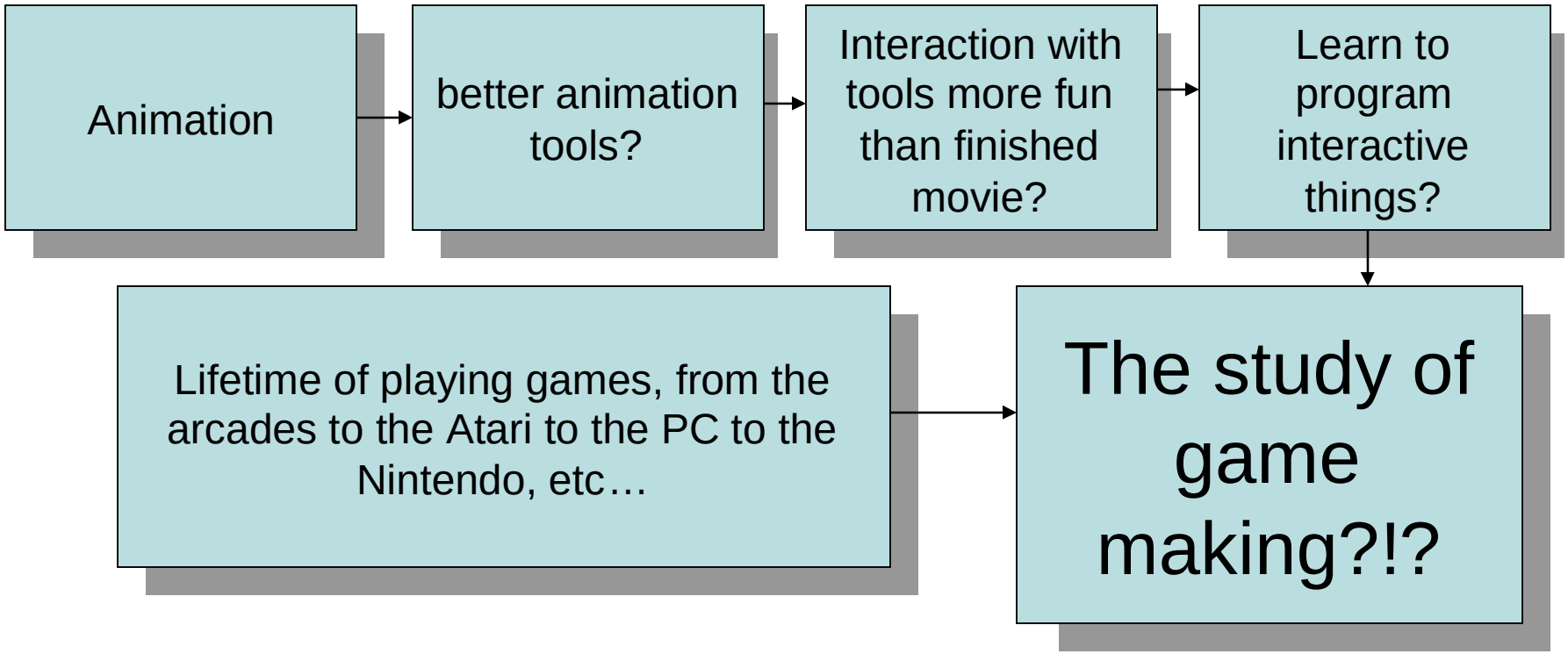
I went to school to be a painter.

Andy a little later…

While I was there, someone showed me a computer, and I started doing computer generated "stuff"



One thing leads to another…



The reason that I point this out…

My background is decidedly "non-traditional"

It is my motivation

It is my "world-view"

I don't think of myself as a technologist very often, except when I recommend computer parts for my nephews.

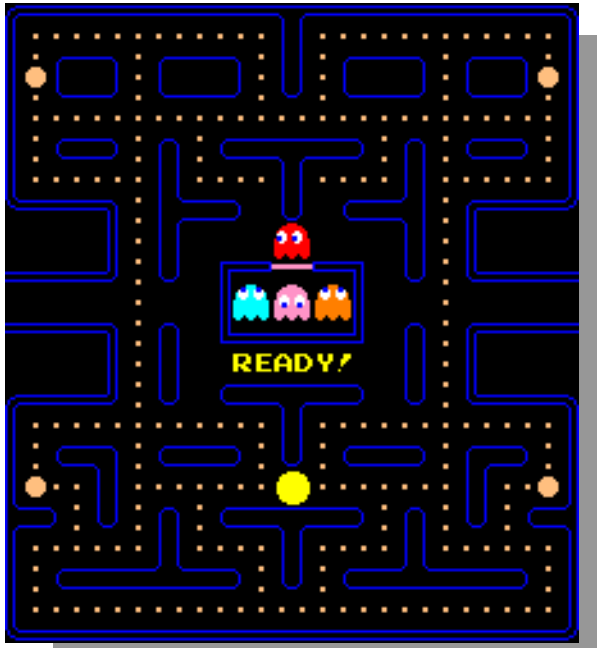
now, let's talk a bit about games

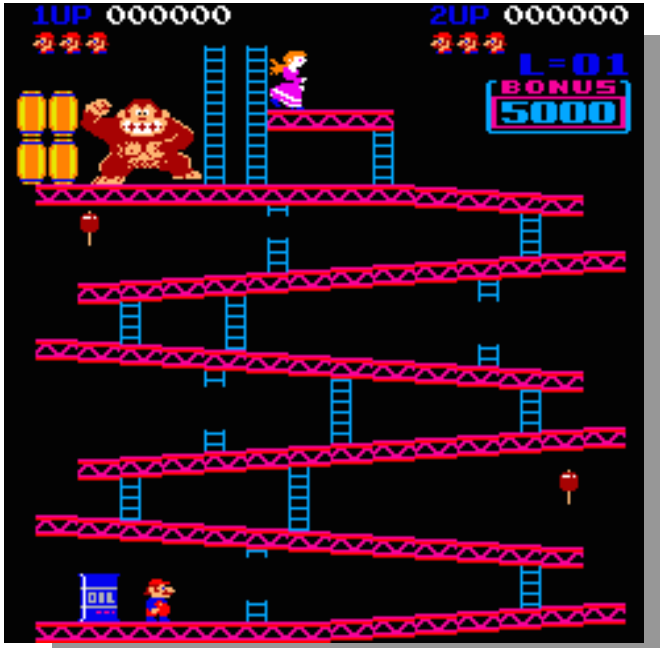
"The best that can be said of them [video games] is that they may help promote eye-hand coordination in children. The worst that can be said is that they sanction, and even promote aggression and violent responses to conflict. But what can be said with much greater certainty is this: most computer games are a colossal waste of time" - Dr. Spock, 2004 ed.

- "ALL children play violent video games"
- "ALL video games are violent"
- "THE INDUSTRY is to blame for peddling violence to children"
- "GAMES are co-opting American education and ruining our youth"
- "GAMES are the cause of childhood obesity"

"couch potato" from www.pushingdaisies.com

When we think of “games”





"And if there is one cultural form that is subjected to this debate, it is the often-despised phenomenon of videogames. Almost since their inception, videogames have been met with rampant prejudice, legislation and stigma. Indeed, they are often 'beneath popular culture'. This is usually related to violence, children and education, or diminished social skills."

Issues around Media Value

[ ] True

[ ] False

Reading books is a better way for a child to spend their time than playing games.

That Rhymes with "P"…

H1, The 'River City' Hypothesis. The advent of a new medium will first give rise to fears of displacement of 'constructive' activities and of associations with deviant behavior.

H2 , The Fear Order Hypothesis. With the advent of video games, news frames involving children will occur in the following order: fears of destructive displacement of worthwhile activities (*H1*); fears of negative health effects; and, then, fears about the effects of content on values, attitudes and behavior. – Dmitri Williams UIUC

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On the global scale, the sale of video game software reached 25.4 billion in 2004.

75% of all American head-of-households are game players.

Estimates place the number of jobs in this industry in North America at approximately 100,000.

Current projections forecast a global growth rate in software sales of 16.5% compounded annually through 2009.

The average age game player is 30, with significant markets from pre-school through seniors.

Of the known player-base for all online, computer, and console games in the US, approximately 57% of players are male, and 43% female.

Game genres

Arcade
Sport Simulation
Vehicle Simulation
Puzzle
Games of Chance
Strategy
Board Games
Horror
FPS
MMORGP
Fantasy and/or SciFi
Military Simulation

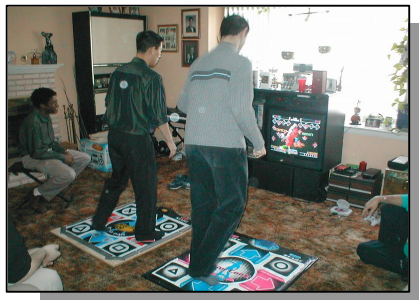
Mobile Games
Casual Games
Educational Games
Serious Games
[and counting...]

What do “games” teach us?

We. Don’t. Know.

We do “know” that causation is possible.

Are games teaching the Scientific Method?



DDR Image Google Search Result: http://www.8ttb.com/_images/pics/pictures/mini-6%20-%20injik%20is%20a%20DDR%20junkie.JPG

“The player must *probe* the virtual world [world interaction…].

Based on reflection while probing and afterward, the player must form a hypothesis about what something might mean in a usefully situated way.

The player *re-probes* the world with that hypothesis in mind, seeing what effect he or she gets.

The player treats this effect as feedback from the original world and accepts or rethinks his or her original hypothesis.”

-Steven Johnson

"Take for example the basic notion of a quest. Within a typical MMOG, a quest provides a description of a task to be performed, basic information about what resources are needed, and a reward to be received when the task is completed. One of the key traits of a questing disposition is the willingness to find, analyze, and evaluate resources needed to complete a task. One's disposition toward the world is characterized by the belief that *if you try hard enough* you will find what you need along the way, that the world itself will afford the resources that are needed to solve it. Accordingly, a quest disposition is one which is tied to resources and which focuses on the contingency and possibility, but also which demands a high level of situational awareness." – Doug Thomas and Seely Brown USC

Maturity of Media Consumption

- Once you tackle games, you are associated with the stigma.
- What can be done to raise public awareness of games as media, games as culture, and a mature outlook towards media consumption and development?

GAME EDUCATION SpecialInterestGroup

GAMES FOR CHANGE

igda international game developers association

Serious Games initiative

WIGI

games FOR HEALTH

now, let's talk about "research"

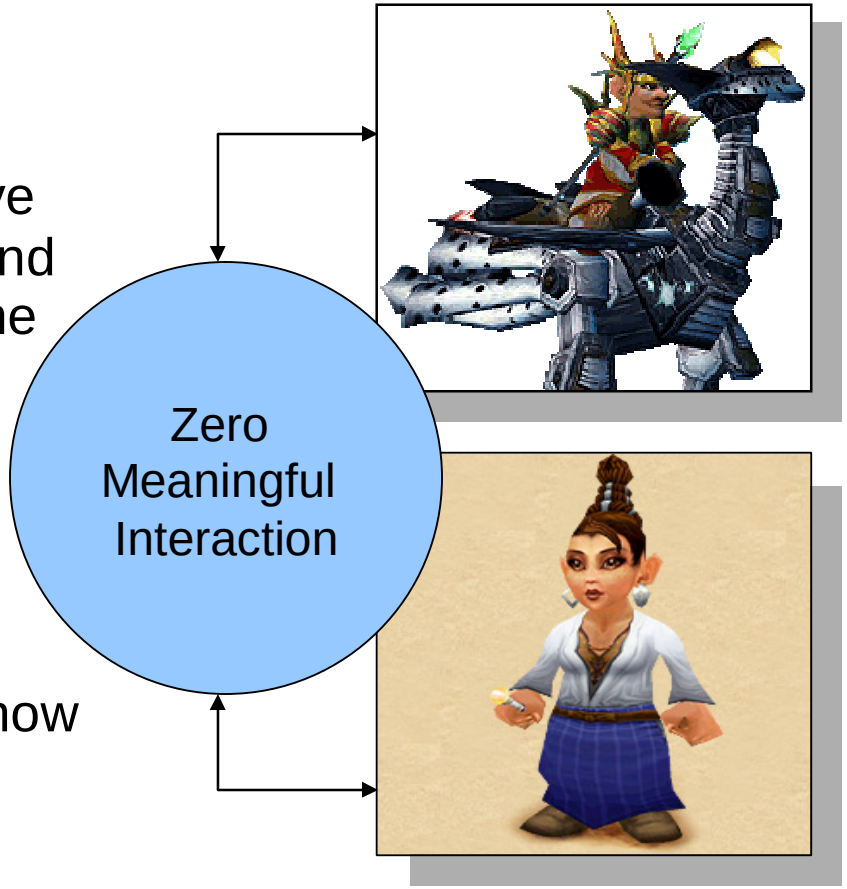
Can we teach using “games”?

Gulf of Expectation:
Today’s student is motivated by games, modding, music-lists and collaborative computing. In contrast, today’s programming classroom is (still?) isolationist, focused on syntax rather than intellectual meat, and revolves around toy problems that can often be solved with a calculator, which sidesteps real learning.

Divisional Groups:

Upper Division Groups: Have learned the introductory material and have "suffered through" to get to the "good stuff" (i.e. the game engine courses)

Lower Division Groups: Are just arriving on campus eager to change the world, but don't know how to get started.



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Create a virtual environment that allows students to **realize game-world-like achievement / artifacts**, and allows for socialization across the **capability gap**.

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Department of Information Technology
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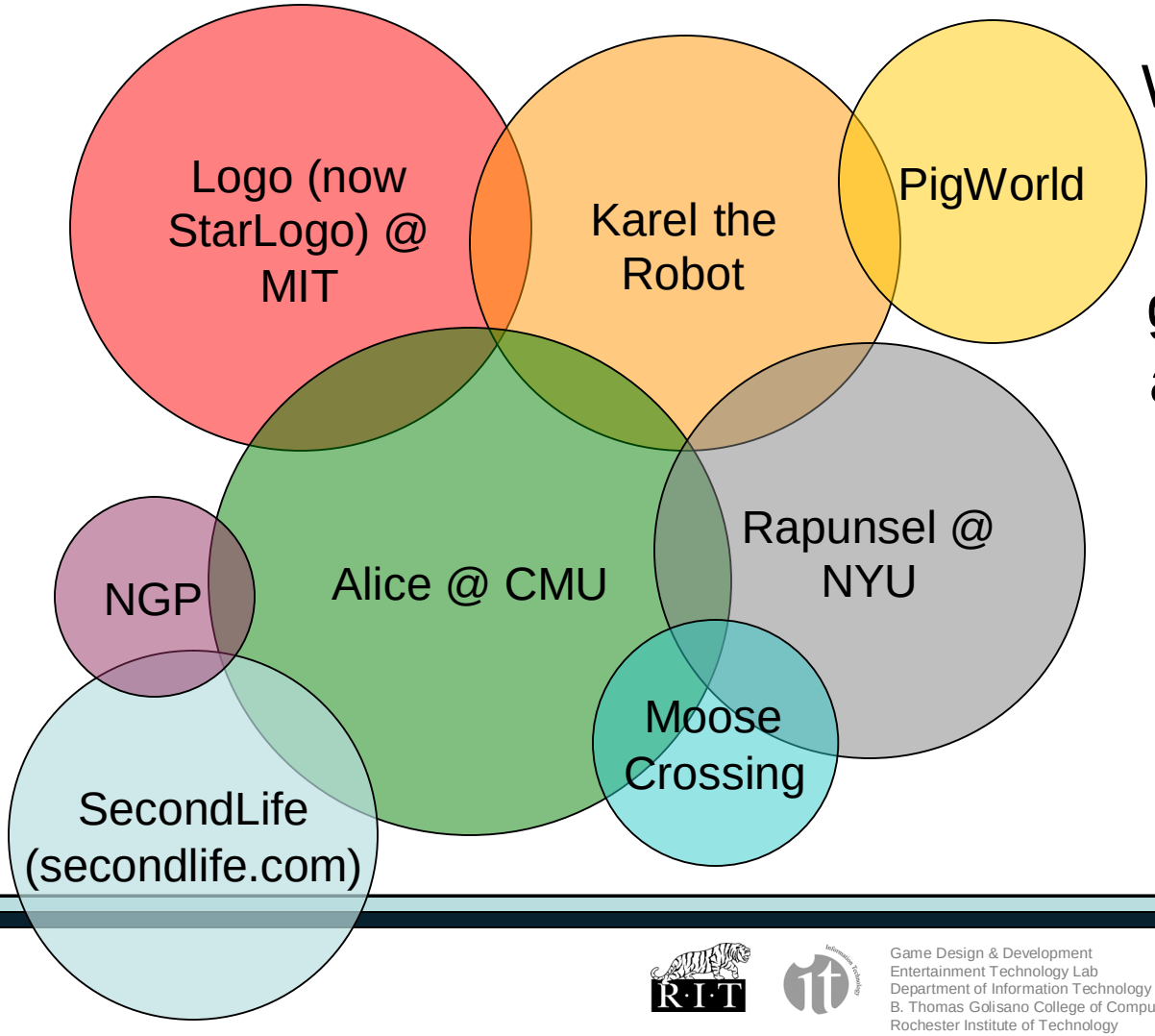

We wanted something that felt more game-world like in terms of graphics, interactions, and social constructs, but that also preserved the compilation / authorship process common to first-year computing curricula.

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MUPPETS.RIT.EDU

"A system for students to learn to program visually, without modifying their curriculum. A game engine to teach how to build game engines."

APPLICATIONS IN:

Visualization
Programming Education
Simulation & CSCW
Virtual Theatre

Microsoft® Research

SIGGRAPH 2005 COURSE
Presentation at GDC 2005 & Serious Games Summit, Washington DC, 2005.
Published in ACM Queue February 2004.
Published in Conference on Information Technology Education 2003, 2004. Journal of Game Dev. 2006
Featured at the Computer Gaming Tech. Conference, IEEE Frontiers in Education, MSR Faculty Summit, ACM OOPSLA

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How is M.U.P.P.E.T.S. Research?

Discovery- New technology, new understanding, new approaches

Integration-cobbling together existing bits in new ways

Application- applied to a wide variety of domains from teaching to visualization

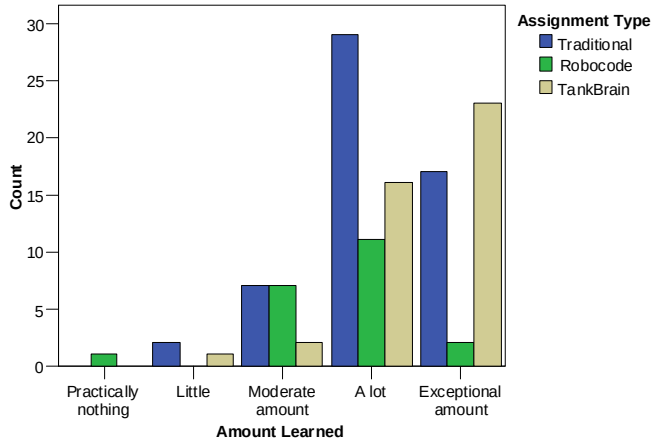
Teaching & Learning – attempting to modify formative and participatory learning in our curriculum

(I don't actually think about this very often, if at all…)

They think they learned more (not clear that they actually did)

Closer to their goals and expectations?

More relevant to their peers?



	Assignment Type	N	Mean Rank
Amount Learned	Traditional	55	57.41
	Robocode	21	38.90
	TankBrain	42	72.54
	Total	118	

Work previously presented by A. Phelps, C Egert, K Bierre and P Ventura at SIGCSE 2006

"I want to be a game developer when I grow up" – #2 national survey of 5th graders

Games as a "hard problem"

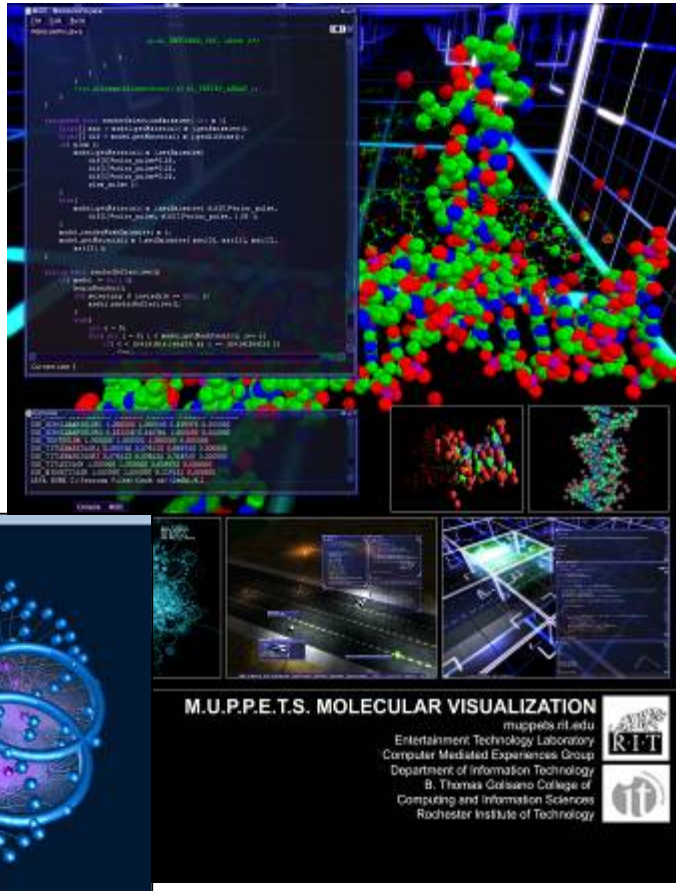
Lack of conceptual understanding

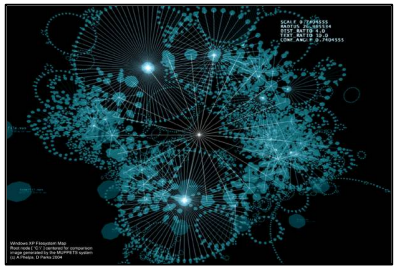
"In the game, I can be whomever and whatever I want to be."

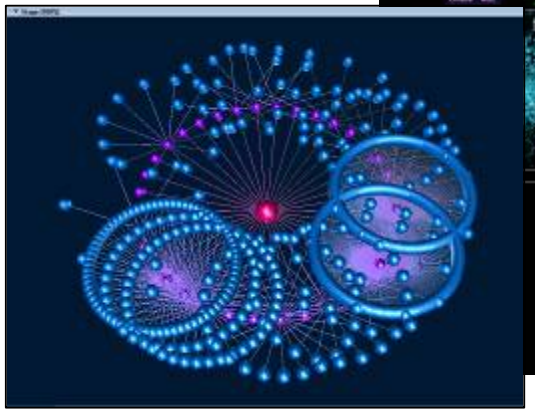
- True Names, Vernor Vinge

So Many Unique Opportunities

Virtual Theatre – Joe Geigel & Marla Schweppe
Molecular Visualization – Paul Craig & Ed Huyer
Filesystem Visualization – Andy & Dave Parks







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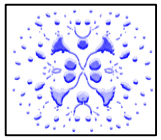
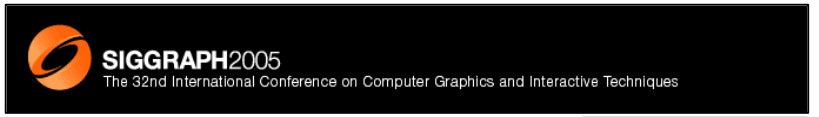
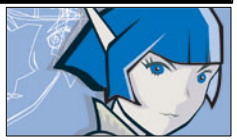
SIGGRAPH 2005 [course materials available online]
IEEE Frontiers in Education 2005
Serious Games Summit D.C. 2005
Game Developer's Conference 2005
ACM SIGITE 2004
ASEE IEEE Regional Conference St. Lawrence Division 2005
ACM SIGITE 2003
Computer Gaming Technologies Conference 2003
ACM Queue February 2004
WIRED News 2004
NSF Ready-2-Net Research Broadcast 2003
Digital Biota 2005
ACM SIGCSE 2006
Microsoft Research Faculty Summit 2006
FuturePlay 2006
Games + Learning + Society 2.0
Gamasutra 2005
Journal of Game Development 2006
Xerox Research Center 2005
Microsoft Research Games in CS Education RFP 2006







So How Did All of that "Happen"?

Curriculum Development?

Amazing Students?

RIT Environment?

Had something to attract funding with?

now, let's talk about curriculum

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In 2000, I proposed a course on "game programming". It was shot down, and was changed to "2D Graphics Programming" to avoid "the 'G' word"

In 2002, my Concentration in Game Programming for grads was on the front page of the business section of the NY Times. (I got a lot of calls that week)

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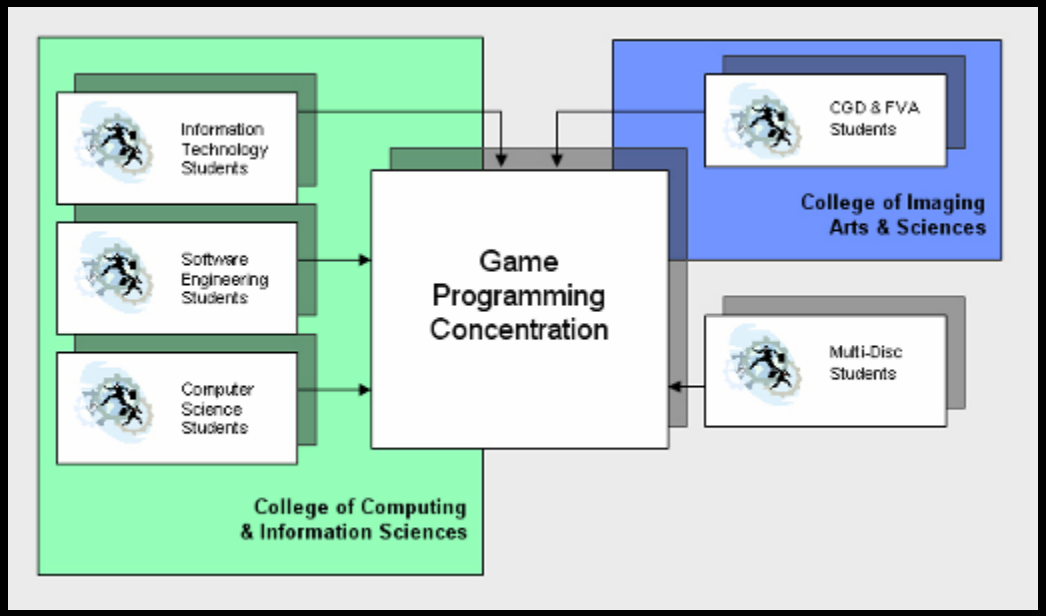

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My courses attract my students.

I've never cared what department they are from – IT, CS, SE, Art, Multi-disciplinary studies, whatever.

In 2002, I proposed and wrote a draft of a MS in Digital Spaces with some colleagues.

Our advisory board loved it.

But it didn't go anywhere.

I got involved in the curricular process (and met a lot of really wonderful people!) – This was my outreach into the RIT community.

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Without the gaming coursework, I wouldn't have been able to write M.U.P.P.E.T.S. – would have had no students "into this stuff" – no connection. (Teh D4V3!!)

Without M.U.P.P.E.T.S., I'd have made uninformed decisions in the curriculum – it taught us so much about what students needed to learn.

The M.U.P.P.E.T.S. Team

(those "great students" from earlier)

Dave Parks (IT) – Linden Labs

Eli Tayrien (CS) – Microsoft Game Studios

Andy Lorino (IT) – Sony Computer Entertainment

Luis Ramirez (IT) – Electronic Arts

Albert Vasquez (IT) – Vicarious Visions

Peter Kuhn (SE) – junior (Microsoft Research)

Michael Clark (Multi-Disc Studies) – just graduated

… the list goes on…

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When we talk about research informing curriculum, we rarely talk about curriculum informing research. But isn't the curricular process an in-depth analysis of the field?

If we believe in this model, is the way we structure faculty responsibilities "correct"?

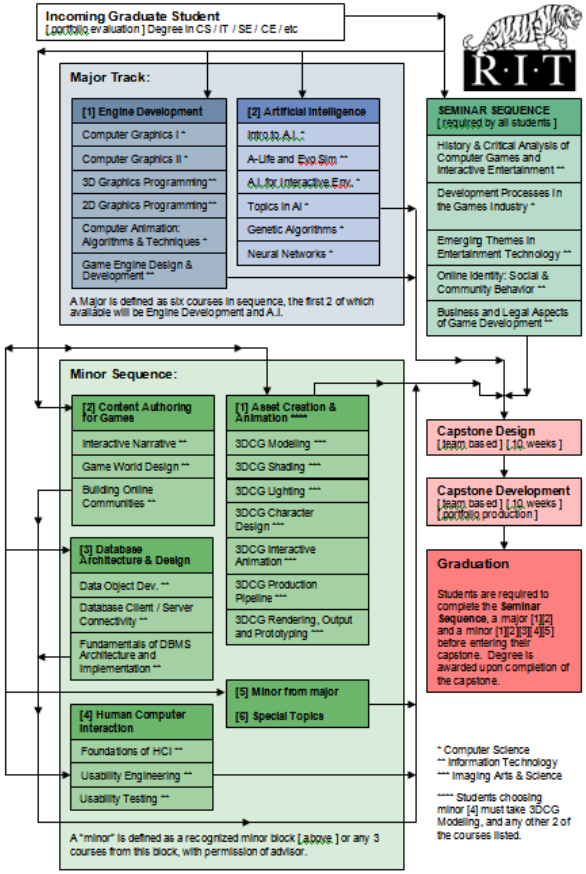
Curricular Map

All students take the “Seminar Track”

Current majors are Engine Development and Artificial Intelligence

Current Minors are Content Authoring, Database, HCI, Asset Creation & Management, “Minor from non-major,” and Special Topics (working on Technical Communications from COLA now!)

All students complete a Capstone Design & Capstone Development Sequence



Traditional Computing

Game Engine Engineering
Programming / Compilers
Graphics and Display
Memory Management
Sound Engines
Artificial Intelligence
Networking
Database Representation
User Interface Design
Custom Input Hardware

Non-Traditional Challenges

Dealing with Artists
Dealing with Writers
Dealing with Musicians
Playability & HCI & Interaction Des.
Marketing & Publishing
Player Communities
Online reputation and trust

"THE FUN FACTOR"

What's next?

HD-DVD / Blu-Ray Integration (3rd G Consoles X-Box360, PS3, Revolution)

- Media Center Integration
- Games with several points of entry
  - Wired and Wireless
  - Stationary and Mobile
  - Multi-user and single-player
  - Games as Service
- Multi-Processor Parallel Programming
- New Distribution Channels and Casual Play

WHAT WE DO

Prepare students for work in the games industry.

Reduce the need for 'on the job' retraining immediately on hire

Produce well-rounded students capable of working with a game production team.

WHAT WE DON'T DO

Play games all day

Give less than 200% engineering effort

Ignore relationships with formal theory in IT/CS/SE

What our process did for us

- Talked to ~30 gaming companies
- Surveyed ~400 schools CS/IT/SE/MIS/GDD
- Involvement with IGDA standard
- Published work and talks on curricular design, dealing with administration, etc.
- Curriculum as a PUBLIC WORK
- My colleagues and I changed the entire culture of our department, and parts of our college!

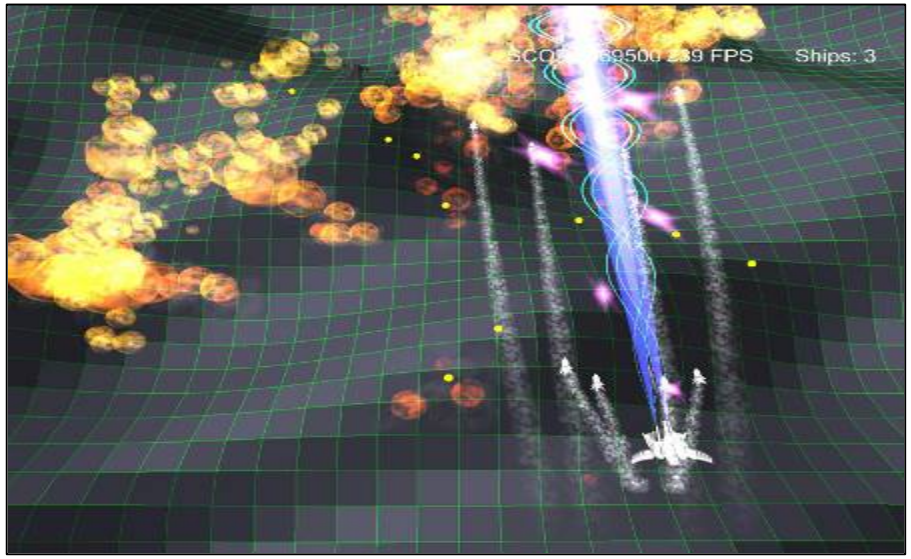
Dreams, Inc.

Our curriculum also finally put a face on what students have been saying for a long time.

“Do What you Came Here to Do” – EGS 2001

Never underestimate a motivated student. They are very bright when they choose to be.

Student Games



Interestingly, these two games formed the core of both the game the follows, and of the M.U.P.P.E.T.S. engine structure...

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Promotional game for the IT Department
Independent Games Festival 2004
Summer 2004

Team “Freakout” is:

Alex Cutting
Eli Tayrien
Andrew Lorino
Michael P Clark

Recently, we gave a copy of this game to Tom Golisano as a commemorative gift.

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Mega Monkey Mayhem [M3]

Independent Games Festival

Coursework from IT and CS

Worked with A Phelps & J Bayliss for completion

Jason Winnebeck
Jon Hilliker
Geoff Goodwin
Peter Mowry

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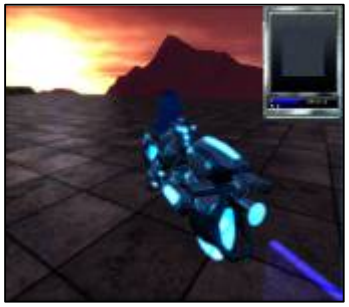
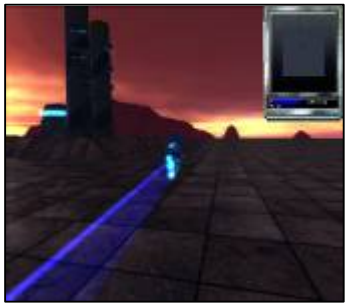
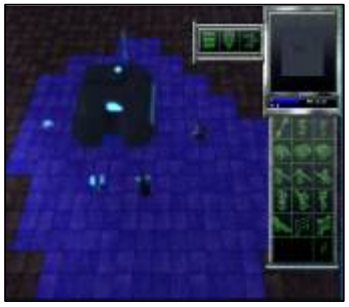
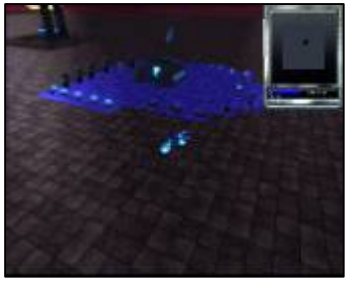
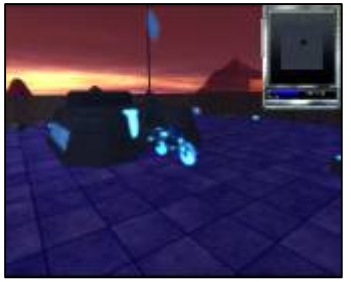
SLIPFIELD



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RESEARCH into GAME EFFECTS

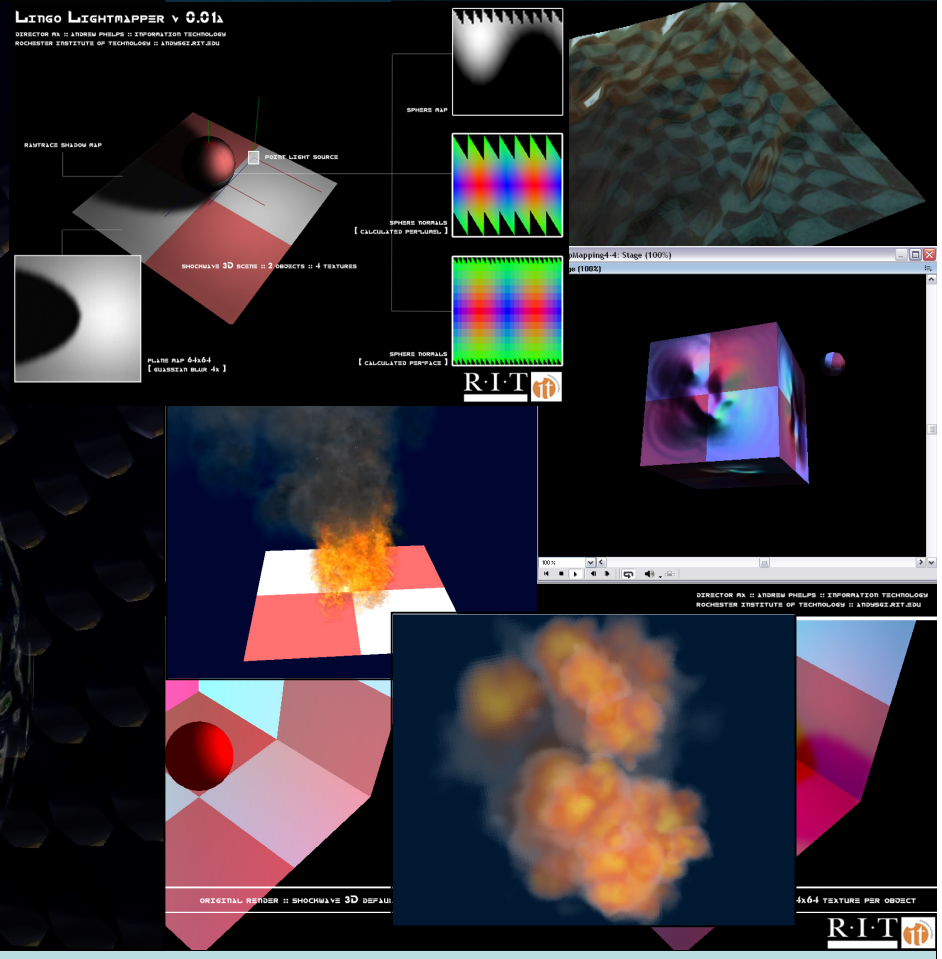
Natural Effect Simulation

L-System Explosion Trees

Lighting and Rendering

Cg from S3D

[…and so on…]



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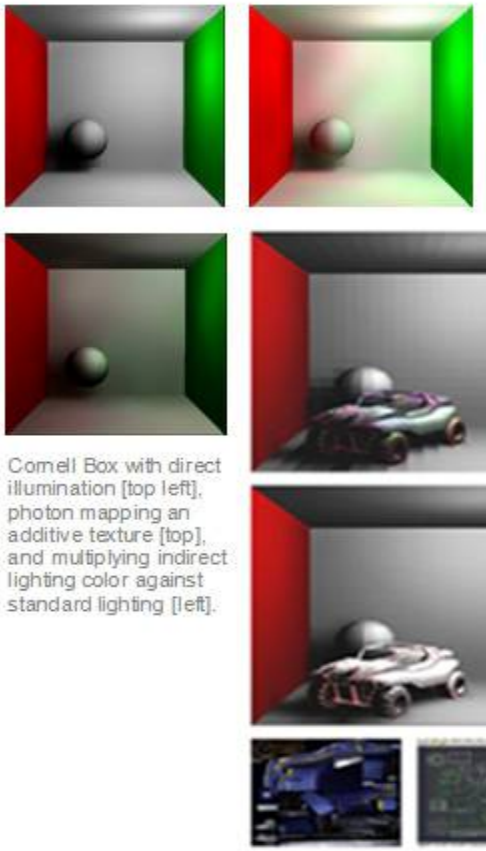
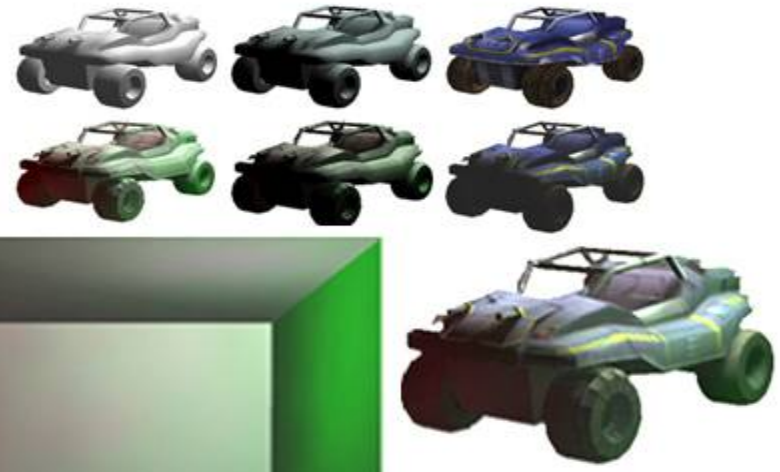


Cornell Box with direct illumination [top left], photon mapping an additive texture [top], and multiplying indirect lighting color against standard lighting [left].



A jeep model with standard S3D lighting (top left), smoothed diffuse lighting (top middle), a default texture (top right), indirect lighting (lower left), the sum of direct and indirect lighting (lower middle), and the final composited lighting and texturing layers (bottom right). A detailed final view is shown to the right.

Game Design & Development
Entertainment Technology Lab
Department of Information Technology
B. Thomas Golisano College of Computing & Information Sciences
Rochester Institute of Technology

A NEXUS OF EDUCATION, INSPIRATION, RESEARCH AND PLAY

ANDREW PHELPS 2006

R·I·T Faculty Scholars

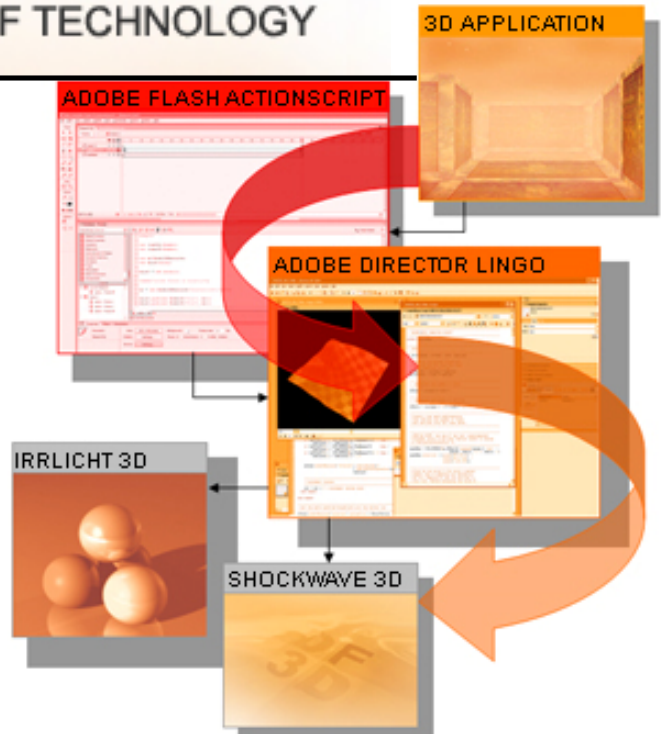
GAME DESIGN & DEVELOPMENT GOLISANO COLLEGE OF COMPUTING & INFORMATION SCIENCES

DF 3D — DIRECTOR & FLASH FOR 3D

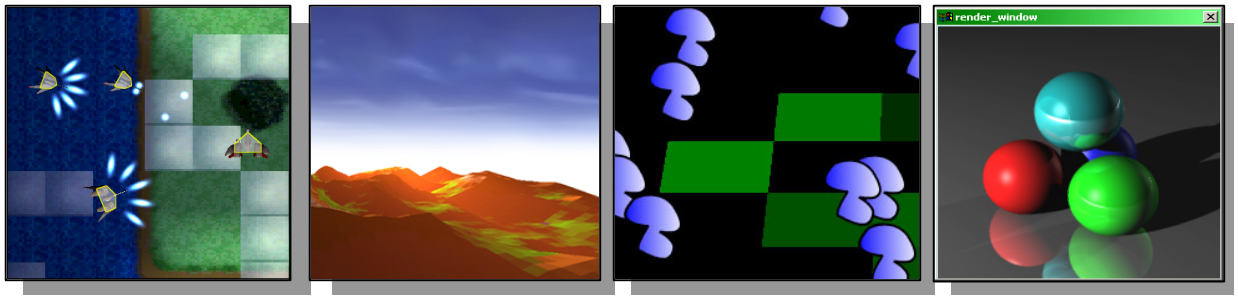
AN ACTIONSCRIPT 2.0 API FOR DEVELOPING SHOCKWAVE 3D GAMES, ARTISTIC SIMULATIONS & VIRTUAL ENVIRONMENTS

ROCHESTER INSTITUTE OF TECHNOLOGY

Research into casual game creation tools, creation of libraries and APIs to allow users of Flash to author true 3D scenes. [coming in 2006 for NYSCATE with Chris Egert].

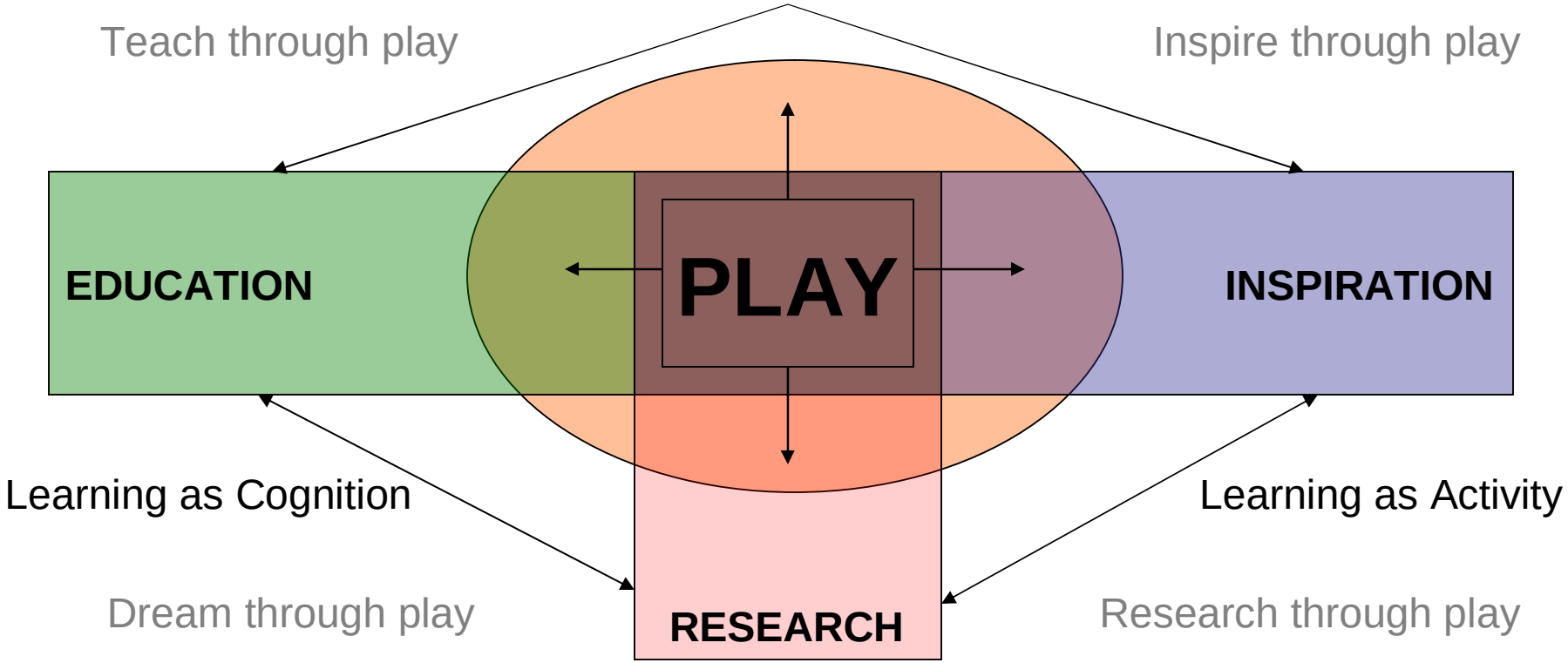


Several other play spaces in casual games tools:



Does my experience teach us anything?

The Nexus


Teach through play
Inspire through play
EDUCATION
PLAY
INSPIRATION
Learning as Cognition
Learning as Activity
Dream through play
RESEARCH
Research through play

Lessons for me personally

If you do “good things,” things will work out

Concentrate on things that reflect your core belief system and academic interests

Find friends and band together

If you think of work as work, you are doing something wrong

My voice is amplified, I am taken way to seriously

Not worrying about what I do

- Talked to Pediatric Grand Rounds at RGH and Strong Memorial about games + health
- Working with Jorge and others on games exhibit at Museum of Play
- Presented on “Dealing with Academic Administration” at FuturePlay 2006
- Presented with Chris Egert in 3rd Grade elementary classes downtown on game development
- Writing with Wisconsin-Madison on games & culture
- Building our website games.rit.edu with students
- Working with Paul Craig on some new PLIG stuff
- Reviewing curriculum for other schools both nationally and internationally
- Was on a panel on digital entrepreneurship at CoB Brick City
- Presented with Amit Ray at the COLA event on Open Source

Lessons for the department?

My department let a junior faculty member propose a course, then a concentration, then a degree (I like to think it worked out OK)

Slush funds occasionally come in handy, and occasionally start great things (Thanks for half of that Sun server, Eydie)

Get 5 people to agree on something, and anything can happen (if one of them is your Dean, you win!)

Faculty that have time to play sometimes produce things

Don’t misguide your new hires – help them establish a direction of their own

Lessons for the Institute?

What an incredible place to let this happen

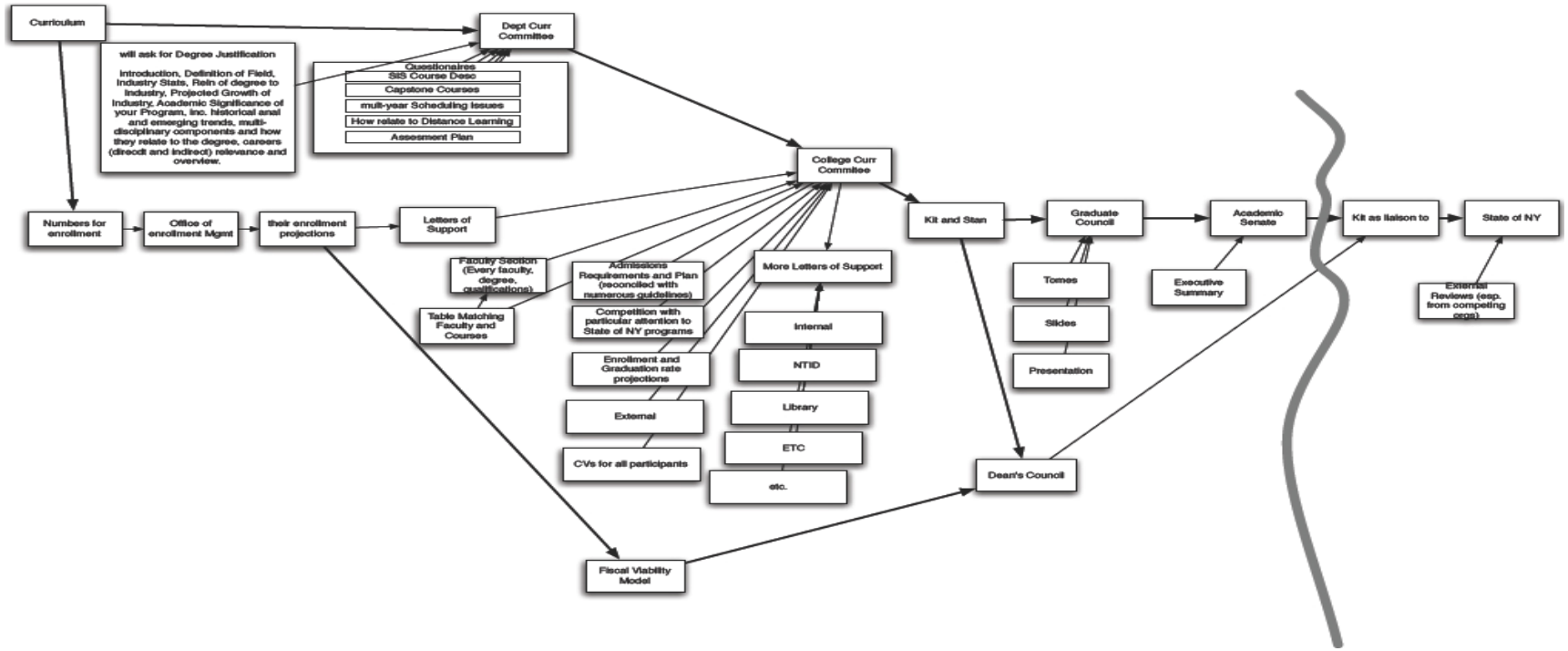
We could have been first in the nation. How can we react quicker? More effectively? More efficiently?

How can the slow-down of collaboration be minimized?

Respect for new and emerging technology, markets, and disciplines, and faculty

Investing in junior faculty and new research pays off sometimes…(PLIG PLUG!! ~ Thanks Stan & Co.). Even non-traditional faculty with weird backgrounds…

Degree Proposal Process



Lessons for the Institute?

As we move from a teaching university to something “blended” – our own faculty & administration are a resource, not a hindrance.

Worry less about “what we should be doing” and spend a lot more time **PLAYING**.

Make a place students **WANT** to be, not a place they **HAVE** to be.

Our Mission

Help students realize their dreams

(my way to do this is to play with them)

(and perhaps realize some of mine along the way, too)

(and have fun along the way)

Thank You

Al Simone, Stan McKenzie, Jorge Diaz-Herrera, Wiley McKenzie, Eydie Lawson, Jim Leone, Steve Kurtz, Steve Jacobs, Chris Egert, Chad & Elissa Weeden, Jeff Lasky, Jessica Bayliss, Joe Geigel, Warren Carithers, Kevin Bierre, Keith Whittington, Margaret Reek, Nan Schaller, Bill Stratton, the IT Faculty, the staff at Wally, Tracy, SRS, Dave Parks, Eli Tayrien, Alexander Cutting, Aaron Cloutier, Peter Kuhn, Albert Vasquez, Luis Ramirez, Luis Lu, John Hillaker, Jason Winneback, Jon Heise, Ed Huyer, Michael P. Clark, Mark Blakely, Greg Hartman, Matt Anderson, Douglas Alexander, Jon Parise, Dan Kunkle, Paul Stella, Kelly Downs, Nadia Bobalek, Walter Wolf, Varda Main, Kit Mayberry, Mike Saffron, and a bunch I'm sure I have forgotten…

Ashley & Emma Phelps

For all of the support you have given me over the years, and continue to provide.

Questions & Contact Info

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